THE EFFECT OF DIVORCE ON SUICIDE IN DENMARK, 1951–1980

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Past research on the effect of marital dissolution on suicide is limited largely to the cultural and institutional framework of the U.S. The present article studies Denmark, a nation with a different social context. A Cochrane–Orcutt iterative regression analysis replicates the American-based pattern for Denmark. The divorce index is more closely associated than the unemployment rate with changes in the suicide rate. A 1% increase in divorce is associated with a 0.32% increase in suicide. Divorce trends also predict the incidence of youth suicide. The study further confirms the generalization that links rapid change in kinship structures to suicide in industrial societies.

INTRODUCTION

Given the lack of comparative assessments of American-based studies, regularities found in the U.S. research could simply be the product of some limited set of socioeconomic or political circumstances (Kohn 1987, p. 713; Rokkan 1964). Stack (1987c) posits a clear need for work on other nations, since most work on suicide is based on American samples. This includes research from every major perspective: imitation (see Phillips 1986 for a review; Stack 1987a), economic/anomie (see Platt 1984 for a review), status integration (Gibbs and Martin 1964; Gibbs 1982), and social integration (e.g., Breault 1986; Kowalski, Faupel, and Starr 1987; Stack 1987b; see Stack 1982 for a review).

My study focuses on the integration model, particularly attending the marital integration aspect. Denmark provides an interesting case for comparison. Its divorce rate is much lower than the U.S.'s, possibly so low as not to affect the national suicide rate.[1] Also, it has a well-developed social welfare state that might provide economic cushions against the problems of living often encountered due to divorce (Hendin 1965). Time series data on divorce and suicide in Denmark from 1951–1980 are analyzed. The divorce rate in Denmark increased rapidly from 1.55 in 1951 to 2.65 in 1980. Demonstration that this increase in divorce is associated with significant increases in suicide would further confirm the link between marital dissolution and suicide across industrial societies undergoing rapid change in family structure.

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MARITAL DISSOLUTION AND SUICIDE: THEORETICAL PERSPECTIVES

Theoretical work linking divorce to suicide has pursued a number of conceptual schemes. Status integration theory (Gibbs and Martin 1964) links divorce to suicide only to the extent that divorce is linked to statistically infrequent status configurations that indicate problems of living, such as role conflict. Further, proponents of the theory contend that a major alternative, Durkheim's social integration perspective, is not really a theory at all and is untestable (Gibbs and Martin 1964, p. 7). They charge that Durkheim never presents an explicit denotative measure of social integration. Still other writers, who deem Durkheim's theory testable, find serious problems in distinguishing between his concepts of integration and regulation, and write of his "one cause" of suicide (Pope 1976, pp. 48–49; Johnson 1965). Pope (1976, p. 77) prefers to combine Durkheim's twin concepts into their common denominator, the rate of interaction. Further critical work concedes that Durkheim's theory involving marital-family status is important, but considers gender, which he treats in an ad hoc fashion, even more so (Danigelis and Pope 1979). In spite of the criticisms leveled against the theory, most work on divorce and suicide employs a Durkheimian (1966) explanatory scheme (e.g., Breault 1986; Trovato 1986, 1987; Stack 1980, 1981, 1985).

Durkheim's theory of divorce and suicide is part of a much larger explanatory paradigm. Seeking to explain the rise of suicide rates in nineteenth century Europe, Durkheim constructed a theory of suicide based on the concepts of egoism (lack of integration) and anomie (lack of regulation). Modernization increased egoism and anomie since a new institutional apparatus based on "occupational groups" did not accompany the process (Durkheim 1965, 1966). The drive toward individualism in the market place and Protestantism in the churches was paralleled in family breakdown. Ancestral homes based on the extended family gave way to geographic mobility of family members and the emergence of the nuclear family. Bonds to relatives relaxed as part of this transformation, thereby decreasing integration in or subordination to the kinship system.

Durkheim's principal conceptualization of familial egoism/anomie is based on the relative isolation of the individual from the integration and regulation found in the structural features of family life. Hence, the statuses of divorce, singleness, and widowhood are used to measure such structural isolation. Discussions on marital integration lump the divorced into the category of nonmarried (Durkheim 1966, pp. 171–185), while those on marital anomie (Durkheim 1966, pp. 259–276) focus on the divorced. Divorce represents both a low level of social integration in domestic life and a state of malregulation. Durkheim (1966, pp. 171–276) argues that the divorcee is malintegrated and malregulated given the loss of a set of responsibilities to a spouse and, perhaps, children. Responsibilities to kin help prevent suicide in a number of ways. These include forgetting one's own suicide-provoking troubles by losing oneself in the troubles of others. Also important is the setting of limits on material, sexual, and other appetites that could foster the destructive problem of anomie.

Durkheim's (1966, pp. 262–268) position on gender differences in the divorce–suicide relationship is not altogether consistent (Pope 1976, p. 135). First he (1966, p. 262) discusses a key table: "Divorced people of *both* sexes kill themselves between three and four times as often as married persons." His data and this statement clearly indicate

that divorce affects both genders about the same relative to their same-sexed married counterparts. Nevertheless, these data are not consistent with a proposition from another section of his book. There, women are viewed as gaining little relative to men from marriage, and, unlike men, "biologically" regulated. The present study stands with Durkheim's (1966, p. 262) only direct data on the problem and assumes no gender differences in the impact of divorce on suicide.

An alternative explanation for the link between divorce and suicide is Gibbs and Martin's (1964) theory of status integration. Statistically infrequent status configurations (e.g., divorced male, divorced female) are viewed as marked by conflict and tend to be avoided. Such configurations are apt to be marked by incompatible statuses and/or role conflict. A low proportion of people are in the status of "divorced." As such, they should have a higher suicide rate.

Finally, additional explanations for a link between divorce and suicide may not mention Durkheim per se, but use various psychological states and social characteristics described in his work. Divorced persons are posited at high risk due to their higher than average social isolation, loss of supportive companionship, a deep sense of disorientation, their failure to achieve a very important goal of life (a happy marriage), and financial stress given that two new households are often supported with little increase over the formerly joint income (see Stack 1982 for a review). Durkheim does not fully explicate the last condition, but it fits nicely into his general theory of economic anomie: a sudden change in the balance of financial means and ends creates suicidal propensities. Lester and Lester (1971) suggest that people have naive reactions to divorce. Suicide can be a product of the deep guilt felt for perceived self-produced loss of a spouse through divorce. Also, naive divorcees may blame marriage with their ex-spouse for their unhappiness: when happiness is not achieved even in their absence, suicide is sometimes perceived as the only alternative to a life of unhappiness (Lester and Lester 1971, p. 66).

Much evidence gathered since Durkheim supports the marital dissolution-suicide relationship. Cross-sectional evidence that divorce is related to suicide includes Breault's (1986) analysis of the 3,000 American counties for both 1970 and 1980, Stack's (1980) analysis of the 50 American states, analyses of local communities (Sholders 1981; Maris 1969), Trovato's (1986) analysis of Canadian provinces, Gibbs's (1969) analysis of 1950 national data, and Smith, Mercy, and Conn's (1988) recent micro-level analysis of 1979–1981 death certificates for the nation as a whole. Time series analyses, while less numerous, support the relationship for the U.S. and Canada (Stack 1981; Vigderhous and Fishman 1978; Trovato 1987). While authors variously interpret these findings (e.g., Kowalski, Faupel, and Starr [1987] argue that they hold only for nonrural counties), they concur that divorce and suicide are generally closely associated. Finally, status integration theory is supported by numerous studies (Gibbs 1969, 1982). A study by Stafford and Gibbs (1985), however, does not support the theory as it applies to "between columns" tests.

The present study takes a broad theoretical approach to the problem. It assumes that an association between suicide and the divorce rate is affected by the sociohistorical context. For example, a society with rising levels of marital dissolution includes many people still married but very unhappily. Indeed, Weiss (1976) contends that severe marital troubles and tensions may peak during the marital separation preceding a

divorce. While American data are not available on suicide among the separated, Danish data indicate their rate is the highest (Rudfeld 1962). Hence, to the extent that rates of marital separation and divorce vary together, at least two ecological groups are prime candidates to explain the increase in suicides lurking behind a fall in marital integration. The connection between divorce and suicide is also due, we assume, to suicides of family members who are deeply hurt by the process of parental divorce, including children. In addition, in periods with high official divorce rates, we would also anticipate high breakup rates among cohabitants, an increasing alternative institutional form of marriage and family. These breakups would, in turn, contribute to suicides, which would not, however, be classified as involving "divorced" persons.

Further, the rise in divorce and suicide may closely relate to other changes in society which, in turn, further contribute to suicide. For example, as divorce increased in Denmark, the birth rate fell. To the extent that parenting young children promotes discipline and increases marital integration, we would anticipate that a low birth rate contributes to suicide (Durkheim 1966; Stack 1982). A recent study of national data, for instance, finds that having a child reduces a young couple's probability of divorce in the short term from 20% to 5% (Waite 1985).

Finally, a fall in marital integration/regulation may reflect a more general institutional integration/regulation decline found also in work, religion, education, and so on. A rise in divorce in this view derives from greater social change such as the modernization process (Durkheim 1966). Stack (1985), for example, finds American trends in religiosity and divorce so closely associated as to be inseparable, both representing the rise of the culture of individualism noted by such writers as D'Antonio and Aldous (1983). While good religiosity indicators are not available for Denmark and its level of religiosity is not nearly as high as the U.S.'s, any association between divorce and suicide in Denmark may be due to still other linkages between divorce and the Danish institutional framework. This issue is a limitation of the present analysis, as of literally all past analyses (with the possible exception of Stack 1985), given problems in the availability of data and measures of integration in other institutional arenas such as friendship and work. Even Durkheim (1966) was unable to develop his theory much beyond the institutions of family and religion.

The present study tests the following hypotheses:

Hypothesis 1: The greater the divorce rate, the greater that of suicide.

In addition, since divorce often affects younger more than older age groups:

Hypothesis 2: The greater the divorce rate, the greater that of suicide among young people.

METHODS

The dependent variable is measured as the number of suicides per 100,000 population. The data are from a World Health Organization computer tape (personal communication, also published in the annual volumes of the *World Health Statistics Annual*), which also provides annual population estimates used here to calculate the suicide rate.

In addition to the total rate, I also calculate that for the relatively young, ages 15–29. This group is thought especially affected by divorce since most divorces occur in the first 10 years of marriage.

The divorce rate is measured as the number of divorces as a proportion of divorces plus marriages, a measure considered more reliable than a crude divorce rate and used in a previous work as a modest means to get closer to an adjusted or more refined divorce index (Breault and Barkey 1982). The yearly divorce data are from the United Nations (1952–1984b).[2]

To control for economically derived anomie, the rate of unemployment is included. That unemployment is a reliable predictor of suicide rates is well established (see Platt 1984 for a review). Data on unemployment are taken from Mitchell (1980) and are updated with data for the most recent years from the International Labor Office (1979, 1983).[3]

Two key statistical issues in time series analysis are autocorrelation and heteroscedasticity (HS). Both violate basic assumptions of regression analysis with respect to the error term (Lewis-Beck 1980). Autocorrelation involves a significant correlation between the error term and its lag. The present investigation uses the standard Durbin Watson test for autocorrelation (Johnston 1984). HS violates the premise that variance in error terms is randomly distributed across values of the independent variables. The present study employs the well-known Glejser (1969) test for HS. Therein the absolute values of the residuals are regressed on the independent variables. If any of the regression coefficients are significant, a HS problem exists and the equation must be reestimated using an appropriate technique such as weighted least squares (Johnston 1984).

THE ANALYSIS

Table 1 presents the results of an ordinary least squares regression analysis on the total suicide rate (Column 1). The Durbin-Watson d statistic lies in a grey area (1.284 to 1.567, $n = 30$, $k = 2$) where we can neither reject nor accept the null hypothesis of no significant autocorrelation (Johnston 1984, p. 556). However, given the potential problem of autocorrelation, the equations are reestimated using a standard, iterative procedure, the Cohrane-Orcutt technique (Johnston 1984), successful in all equations. The effects of autocorrelation are removed (see Columns 2 and 3).[4]

When the rate of unemployment is controlled, changes in the divorce rate are positively related to changes in the suicide rate (Table 1, Column 2). The regression coefficient for divorce is 6.84 times its standard error. The 95% confidence interval for the coefficient is the coefficient 0.34, $\pm$ 0.10. An elasticity coefficient calculated at the means indicates that for a 1% increase in divorce, suicide increases by 0.32%. The standardized coefficient for divorce indicates that for a 1 standard deviation change in divorce, there is a 0.82 standard deviation change in suicide.

When divorce is controlled, the greater the change in unemployment, the greater that in the suicide rate. The coefficient for unemployment is 3.34 times its standard error. Zero is clearly not in its confidence interval. While the null hypothesis is rejected, the beta coefficient for unemployment (.39) is less than half that for the divorce variable. A 1% increase in unemployment associates with a 0.10% increase in suicide. The model explains 73% of the variance in Danish suicide.

Table 1
The Effect of Divorce On Suicide in Denmark, 1951–1980

	1 *O.L.S. Total Suicide Rate*	*2* *C.O. Total Suicide Rate*	*3* *C.O. Youth Suicide Rate*
A. Regression Estimates			
Divorce rate index	0.34* (.81)	0.34* (.82)	0.04* (.53)
Unemployment rate	0.42* (.42)	0.39* (.39)	0.43* (.65)
Constant	12.91*	13.00*	7.01*
R^2	0.73	0.73	0.62
B. Durbin-Watson Autocorrelation Test			
Durbin-Watson *d* statistic	1.48	1.62	1.79
Autocorrelation coefficient	.16	.05	.02
C. Glejser Heteroscedasticity Test			
Divorce rate index	—	0.04	0.006
Unemployment rate	—	0.03	0.01
F statistic for equation	—	2.85	1.06

Notes: (1) Standardized regression coefficients given in parentheses.
(2) $N = 30$.
* Statistically significant at the .05 level.

The results for youth suicide are free of both autocorrelation and HS (Table 1, Column 3). Controlling for the unemployment rate, the greater the divorce rate, the greater the youth suicide rate. The divorce coefficient here is 3.82 times its standard error. A 1% rise in divorce is associated with a 0.24% increase in suicide. Controlling for divorce, the greater the rate of unemployment, the greater the suicide rate. The economic anomie perspective is also confirmed. The elasticity coefficient is somewhat smaller for unemployment: a 1% rise in unemployment is associated with a 0.20% increase in suicide. The model explains 62% of the variance in suicide.[5]

DISCUSSION: MICRO-LEVEL DEFENSE OF THE ECOLOGICAL FINDINGS

These results, since they are based on aggregated data, should be taken with some caution. As in previous studies of the U.S. and Canada (e.g., Stack 1985; Trovato 1986), the data mask the marital status of the persons committing suicide. Nevertheless, they suggest an association. This ecological association can be, however, better defended given micro-level data that establish a link between marital dissolution and suicide. I now turn to such a defense.

Research on suicide in Denmark, while sparse, has included the role of marital dissolution in its investigatory scheme. While such work is mostly based on small studies, often of suicidal patients, and epidemiological investigations of local communities, it tends to demonstrate clear patterns on the marital status factor (Bille-Brahe, Hansen, Kolmos, and Wang 1985).

Some adjustment of the usual conception of marital arrangements is necessary to

review this literature, however, given widespread cohabitation as a marital form. For example, Blanc (1987, p. 391) reports that between 25–35% of Danish women ages 18–30 currently cohabit. This compares to 4–10% in the U.S., Britain, Norway, Finland, France, and Australia. While cohabitation may not involve as much subordination of oneself to a spouse/children as a legal marriage, it is assumed to involve more integration than living alone or outside a marital form. As such, its dissolution should, on average, contribute to a sense of anomie, and lower integration, thus increasing suicide risk.

Bille-Brahe, Hansen, Kolmos, and Wang (1985, p. 221), in a study of 99 patients (suicide attempters) in the county of Funen, find singleness and divorce are significant risk factors in predicting suicide attempts. Given widespread cohabitation in Denmark, they note that many suicide attempts were precipitated by a break-up of such arrangements. They interpret the dissolution of both cohabitation and marriage from the standpoint of Durkheim's social integration theory (p. 224). From an analysis of 1,004 suicides (death certificate data) for 1956, Rudfeld (1962, p. 208) finds divorced persons' suicide rate to be 7 times that of the married and second only to separated persons'. Unfortunately, further national data on marital status and suicide are unavailable (Bolander 1972, p. 74). Paerregaard (1980, p. 156) speculates that the rise in suicide among middle-aged females in the mid-to late-twentieth century may be due to divorce, which "brings women into a bad position socially, economically, and emotionally." Clearly the available micro-level data from Denmark do not falsify a Durkheimian interpretation of the Danish ecological data.

Other work on suicide in Denmark tends either not to address the role of family life in suicide prevention (e.g., Hansen and Wang 1984; Bille-Brahe and Nielsen 1986), or lumps marital status variables into a larger index such as primary integration (e.g., Bille-Brahe and Wang 1985). Therefore, the impact of a specific family factor like divorce is inseparable from integration measures based on other institutional areas such as friendship and work. For example, in a follow up study of 484 persons who suicided in 1958, Paerregaard (1975) reports that living alone was an important determinant of eventual suicide. Living alone, however, includes single as well as divorced and other marital statuses. Olsen and Lajer (1979) do find that singleness is a significant risk factor for suicide in a sample of bricklayers and carpenters. Much work follows a psychiatric experimental design where the effect of different types of therapy is the principal independent variable (Avery and Winokur 1978).

The available evidence indicates that divorced persons in Denmark have a markedly higher rate of suicide than married persons. Hence, it seems reasonable to assume that as divorce increased in Denmark between 1951 and 1980, the increase in suicide was partially due to marital dissolution. Other groups were probably also responsible for the increase. These would include the separated and cohabitants who dissolved their unions.

CONCLUSION

This study presents a comparative analysis between the U.S.'s and Denmark's divorce-suicide relationships. Although the Danish context represents a different set of social circumstances, such as a much lower rate of divorce, the findings of American-based

research are replicated: the greater the divorce rate, the greater that of suicide over time.

Theoretical interpretation of this finding is somewhat problematic given the ecological nature of the data employed, a problem with previous research as well. I assume that groups in addition to the divorced contributed to the rise in Danish suicide. Local studies on suicide by marital status in Denmark do support the divorce-suicide linkage, reinforcing the ecological findings.

The status integration theory is neither supported nor falsified by the present findings. As the status configurations involving divorce became more common, the overall suicide rate did not decrease. However, to test the validity of status integration theory requires micro-level data comparing the suicide rate of divorced persons divided by that of married persons (coefficients of aggravation) over time. Although the suicide rate may increase overall as divorce becomes more common, the rate may increase faster among the married than among the divorced. That is, the gap between the suicide rates of the divorced and married may be narrowing, as was found in an analysis of the U.S. (Stack 1990). Unfortunately, such over-time micro-level data are not available for Denmark.

One neglected theoretical issue is the extent, if any, to which the divorce-suicide relationship is due to a third variable. For example, the rise in divorce and suicide both might stem from a fall in religiosity. To address this possibility, as does Stack (1985), data were collected and analyzed on a religiosity measure. The religiosity measure was, however, unrelated to either suicide or divorce. The notion that the culture of individualism links both religion and divorce to suicide is not supported by the Danish data.[6] This is consistent with remarks on the high level of secularization of religion in Denmark, which makes it far less likely than religion in Durkheim's day to prevent suicide (Paerregaard 1980).

Finally, nearly a hundred years have passed since Durkheim's (1966) classic work. Suicide in Denmark has either remained high or increased (Paerregaard 1980). While the great transformation of industrialization, urbanization, and secularization, which Durkheim's theory responded to, has subsided, suicide remains high. Evidently, the countervailing institutional framework that Durkheim thought might reverse the rising tide of suicide has yet to be created.

APPENDIX 1

Correlations, Means, and Standard Deviations

Variable	*(1)*	*(2)*	*(3)*	*(4)*
Total Suicide Rate (1)	1.0			
Youth Suicide Rate (2)	0.84*	1.0		
Unemployment (3)	0.29	0.59*	1.0	
Divorce Rate Index (4)	0.74*	0.42*	−0.16	1.0
Mean	22.31	12.49	5.80	20.54
Standard Deviation	2.98	1.98	2.99	7.13

Note: * Statistically significant at the 0.05 level.

APPENDIX 2

Data Series

Year	*Total Suicide Rate*	*Youth Suicide Rate*	*Divorce Index*	*Unemployment Rate*
1951	23.56	14.41	15.42	9.7
1952	22.91	13.75	15.90	12.5
1953	24.12	15.61	15.54	9.2
1954	23.33	14.16	16.14	8.0
1955	23.34	13.50	16.23	9.7
1956	22.48	13.39	15.94	11.1
1957	22.08	13.34	15.66	10.2
1958	21.20	12.55	16.30	9.6
1959	21.03	12.33	15.74	6.1
1960	20.32	11.94	15.77	4.3
1961	16.92	9.74	15.33	3.9
1962	19.00	11.11	14.56	3.3
1963	19.07	11.87	14.41	4.3
1964	21.00	12.38	14.02	2.8
1965	19.31	9.24	13.47	2.3
1966	17.80	9.83	14.00	2.6
1967	17.50	8.55	14.40	3.2
1968	20.51	11.38	16.15	5.3
1969	20.82	9.60	18.62	3.9
1970	21.51	11.08	20.69	2.9
1971	24.79	12.26	29.03	3.7
1972	23.90	11.53	29.79	3.6
1973	23.82	11.67	29.23	2.4
1974	26.02	13.43	28.26	2.1
1975	24.10	13.93	29.37	5.1
1976	23.89	13.99	29.64	5.3
1977	24.29	13.07	29.45	6.4
1978	23.31	12.76	31.37	7.3
1979	25.76	14.73	32.08	6.1
1980	31.58	17.62	33.76	7.0

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NOTES

1. The U.S. has the highest divorce rate (5.19%) in the world (United Nations 1952–1984b). As Trovato (1987, p. 193) contends, the divorce–suicide relationship may not hold at lower levels of divorce. A certain threshold of marital dissolution may be required before significant increases in suicide appear. In contrast, the rate for Denmark (2.65%) was approximately half the American level in 1980 (United Nations 1952–1984b). It is possible, then, that Denmark's level of divorce is inadequate to influence the national suicide rate.

2. A separate analysis using the crude divorce rate produces essentially the same results. For example, the coefficient of the crude divorce rate is 7.7 times its standard error; that for the adjusted divorce rate in Table 1, Column 1, is 7.9 times. The respective beta coefficients are .83 and .82. The amount of variance explained in each of the two models is also very close: 71% versus 73% respectively. The similarity in these findings is due to a very strong correlation ($r = .986$) between the measures.

3. It would certainly be desirable to use an age-specific unemployment rate in the equation for the youth suicide rate, but the necessary data are unavailable. The total unemployment rate is used as an approximation.

4. Further, these results were checked for a second problem regarding the error term, HS. The results of the Glejser tests indicate that none of the coefficients for the two explanatory terms is significant, and thus the absence of any significant HS. As a further check for HS, the F statistic of the equation was calculated. That is, the variables may, taken together, create a situation of HS. The F statistic is, however, insignificant. Therefore the null hypothesis regarding HS is accepted and interpretation of the results can proceed.

5. It may be, however, that a nonadditive model is appropriate. That is, the effect of divorce might follow a multiplicative function with other suicidogenic conditions. In particular, divorce might impact suicide most in times of high unemployment, when the economic effects of divorce are especially harsh on the families involved. To test this multiplicative model a multiplicative term (unemployment times divorce) was added to the equation in Table 1, Column 2 (Wonnacott and Wonnacott 1979). Using the Lewis-Beck (1980, p. 56) test, this addition results in a problem of multicollinearity between the term and one or both of its component parts also in the equation. The independent variables were regressed on the multiplicative term. A high coefficient of determination is obtained, indicating multicollinearity. Hence, a multiplicative model cannot be examined.

Another statistical issue is whether or not a nonlinear model provides a better fit. Nonlinear equations were estimated, but none proves superior to the equations reported in Tables 1 and 2. For example, a logarithmic transformation of the divorce index produces a model that explains about the same amount of variation in suicide (72%) as the linear model in Table 1. The logarithmic divorce term's coefficient is 6.6 times its standard error, less than the 7.9 ratio for the nontransformed coefficient in Table 1. Similarly, a parabolic fit was tested through the use of the square of the divorce term. This model explained 74% of the variance, compared to 73% in Table 1. No compelling evidence favors a nonlinear over linear fit.

6. Data were gathered on religious books as a percent of all books published (United Nations 1952–1984a). For a discussion and defense of this measure see Wuthnow (1977).

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